Forum F117
Treatment of Infections and Infestations in the Pregnant Patient

Jenny Murase, MD
February 18, 2018

Palo Alto Foundation Medical Group
University of California, San Francisco

I do not have any relevant relationships with industry.
Objectives

- To discuss appropriate management of and available safety data in pregnancy for:
  - Bacterial infections
  - Fungal infections
  - Viral infections (Herpes and HPV)
  - Infestations (Scabies and Lice)
Bacterial infections

Photos courtesy of Dr. Dirk Elston
Pyogenic Infections

- Impetigo: Topical mupirocin, oral first generation Cephalosporins, oral dicloxacillin are first line
- Cellulitis: Oral or IV penicillin, oral first generation Cephalosporins, oral dicloxacillin
- MRSA: Clindamycin
- Abscesses: I&D, no antibiotic unless > 5 cm or > 2 cm zone of erythema (cellulitis)
Oral Antibiotics

- First line oral antibiotics: Penicillin, first generation Cephalosporins, Dicloxacillin
- Macrolides: Erythromycin preferred choice over Azithromycin and Clarithromycin

  - Atrial/ventricular septal defects & pyloric stenosis increase with 1st trimester use
  - E. estolate: increased AST in 2nd tri, 10% of cases, reversible [E. base and E. ethylsuccinate do not have this risk]
Oral Antibiotics

- **Clindamycin**
  - Pregnancy class B
  - Inducible resistance to clindamycin has been reported: test for the **erm** gene

Sensitivities via. D-test

- If zone of inhibition is round = letter O = normal
- If clindamycin disk flattened adjacent to erythromycin = letter D = inducible resistance

http://tmedweb.tulane.edu/pharmwiki/doku.php/the_d_test
Oral Antibiotics

- **Rifampin**: tx of choice in TB; mother/fetus peripartum vitamin K prophylaxis

- **Sulfonamides**: 2nd line choice up until 3rd tri (contraindicated peripartum: hemolytic anemia, hyperbilirubinemia, kernicterus)

- **Trimethoprim**: 1st tri folate $\geq 0.5$ mg qd

- **Combination SMX-TMP** is category C: low birth weight and prematurity
Oral Antibiotics

- **Quinolones**
  - Animal studies: cartilage damage/arthropathy; humans case reports
  - Cipro-/Norfloxacin studied the most

- **Tetracyclines**
  - 2\textsuperscript{nd} line therapy up to 14 wks gestation (contraindicated ≥ 15 wks d/t bone growth inhibition, teeth discoloration, maternal hepatitis)
IV Antibiotics

- **Vancomycin**
  - Pregnancy class C but risk of ototoxicity

- **Linezolid**
  - Pregnancy class C, animal studies show fetotoxicity and teratogenicity

- **Daptomycin**
  - Pregnancy class B, Used in life-threatening infections unresponsive to vancomycin; no reported adverse sequelae
Fungal infections

Photos courtesy of Dr. Dirk Elston
Topical Tinea Corporis Therapy

- Imidazoles
  - #1 clotrimazole, #2 miconazole, #3 ketoconazole (cover dermatophytes and yeast)
- Data limited: topical terbinafine, naftifine, and ciclopirox but likely safe
- Topical antifungal agents can interfere with production of estrogen
Topical Candidiasis Therapy

- **Nystatin**: Safe, not absorbed by skin or mucous membranes, but less effective
- **Clotrimazole, miconazole, ketoconazole**
  - Animals exposed to high doses of clotrimazole intravaginally = no defects
- **Data limited**: topical terbinafine, naftifine, and ciclopirox
- **Topical gentian violet (0.5-1% solution)**
Topical Tinea Versicolor Therapy

- Can advise to wait to treat until pregnancy complete
- Limited application of clotrimazole or miconazole therapy safe
- Zinc pyrithione soap or topical benzoyl peroxide soap for more widespread areas
- BPO: Quickly converted to benzoic acid in the skin (which is in food)
Topical Tinea Versicolor Therapy

- Selenium sulfide is pregnancy class C
- Limited application likely safe, minimal absorption
- Selenium levels have been reported to rise if selenium sulfide used on damaged skin for prolonged periods of time
- Selenium poisoning has been reported to result in miscarriage
Systemic antifungals

- **Fluconazole, Ketoconazole, Itraconazole**
  - All imidazole derivatives (-azoles) are not advised during pregnancy: craniosynostosis, congenital heart defects, skeletal anomalies

**Antley-Bixler syndrome**
radiohumeral synostosis, craniosynostosis, joint contractures, arachnodactyly, femoral and ulnar bowing, camptodactyly, carpal/tarsal synostosis, club feet, midface hypoplasia, choanal stenosis or atresia, proptosis, “pear-shaped nose,” dysplastic ears

- **Low dose, short term incidental exposure 1\textsuperscript{st} tri = no increased malformation (detailed fetal US)**
  (1079 women, 4.1\% vs. 3.6\%; J Antimicrob Chemother. 2008 Jul;62(1):172-6).

http://www.thefetus.net/page.php?id=406
Systemic antifungals

- Coadministration of medication in rodents can reduce the incidence of defects
  - Prednisone + ketoconazole: reduction in skeletal defects
  - Citral + -azole: reduce branchial cleft abnormalities
- Itraconazol
  - Implicated in heart failure, increased risk of spontaneous abortion, cleft palate and limb defects
Systemic antifungals

- Oral Griseofulvin
  - Not recommended in pregnancy.

- Oral terbinafine
  - Pregnancy class B but avoid its use

- IV Amphotericin
  - Treatment of choice in disseminated mycoses
  - It is retained in placenta and may cause transient neonatal renal dysfunction
Viral infections
(Herpes and HPV)

http://www.aad.org/skin-conditions/dermatology-a-to-z/herpes-simplex

http://www.dermis.net/dermisroot/en/1270151/imagep.htm
Herpes

- Acyclovir treatment of choice
- Famciclovir and Valacyclovir likely safe

ACOG/CDC recommendations

- Treat primary HSV (7-10 days) and symptomatic recurrent HSV (3 days) in pregnancy
- Start prophylaxis 36 weeks gestation if planning a vaginal delivery
- Do not routinely recommend daily prophylaxis throughout the entire pregnancy
Human Papilloma Virus: what to use

- Liquid nitrogen treatment of choice
- Trichloracetic acid is drug of choice for condylomata acuminata
- Periungular verruca: Squaric acid is non-toxic, non-mutagenic OR IL candida injections
- Salicylic acid: limited application does not bind platelets or cause Reye’s syndrome
Human Papilloma Virus: what NOT to use

- Little data for podofilox, cantharidin, imiquimod (problems with weight gain and bone ossification) so avoid

- Podophyllin pregnancy class X (contraindicated): Deaths in mothers/fetuses, psychiatric symptoms, ear, heart, and extremity malformations
Infestations
(Scabies and Lice)

Photo courtesy of Dr. Dirk Elston

http://www.stanford.edu/class/humbio103/ParaSites2004/Scabies/Scabies%20Home.htm
http://pediatrics.about.com/od/headlice/ig/Head-Lice-Pictures/Live-Louse-on-Hair.htm
Scabies: what to use

- Drug of choice in US: Permethrin (5% cream)
- Drug of choice in Europe: Benzoyl benzoate (25% lotion); banned in the US [metabolite benzyl alcohol → neonatal fatal intoxication]
- Aloe vera comparable to benzoyl benzoate
- Precipitated sulfur (5% or 10% ointment) is safe; <1% is absorbed but less effective
- Ivermectin = no increased cong abnormalities
Scabies: what NOT to use

- Crotamiton (10% ointment or lotion) is likely safe but not as effective, fewer data available
- Malathion causes respiratory depression in children < 2 years old so avoid (class B)
- Lindane is contraindicated in pregnancy (10% absorption: neurotoxicity, seizures, liver damage, hypersensitivity reaction, aplastic anemia)
Occlusive therapy for head lice

http://www.ehow.com/how_2123367_treat-head-lice-cetaphil.html

**Things You Will Need:** Comb, Bath towel, Metal lice comb

1. Apply coconut oil or cleanser to DRY hair.
2. Drape a towel around the shoulders to catch any extra cleanser that drips.
3. Begin at the nape of the neck on the left side and apply the cleanser directly to the scalp moving back and forth from the nape of the neck to the front hairline until you reach the right side. This should use 1/4 of the cleanser.
4. Change the direction of the zigzag pattern to criss-cross the first pattern. Now the application bottle should be half empty.
5. Massage the cleanser into the scalp.
6. Repeat Step 3 and 4. Now the application bottle should be empty. Massage the cleanser into the scalp again.
7. Refill the bottle half full if there is long hair. Squirt the cleanser on the hair strands and massage it in.
8. Wait 2 minutes and then comb out the cleanser. Wipe the excess cleanser onto another towel. The goal is to remove as much cleanser as possible so it will take less time to blow dry the hair.
9. Remove nits with a lice comb. Place the lice comb at the scalp and slowly comb through. Swish the comb in a bowl of water to see if anything comes out. A white bowl works best to spot the nits. Flush the water down the toilet when done.
10. Blow dry the hair so that the scalp, roots and strands are completely dry. This is very important so the cleanser adheres to the lice and cannot be rubbed off on a pillow. Expect blow drying to take three times longer than it normally does. Do not apply hair products.
11. Leave the dried cleanser on the hair overnight or for at least 8 hours.
12. Shampoo with your normal shampoo. You can rinse hair with a 50/50 mixture of vinegar and warm water and then comb again with the lice comb before shampooing. The vinegar helps to loosen the nits.
13. Check daily for live lice and nits. Remove nits immediately. Retreat with cleanser if you see live lice or contact your pediatrician for advice.
14. Repeat this treatment after seven days and again seven days after that to kill any newly hatched lice before they become adults and lay eggs. This is a crucial step to break the lice life cycle.
Recalcitrant Lice

- Treatment if fail multiple attempts of occlusive therapy
  - Permethrin (5% cream)
  - Pyrethrin (0.33% shampoo)
  - Benzyl alcohol (5% to treat lice; 10% concentration can cause mast cell degranulation, this is a newer agent so safety data are limited)
Take-home points

- Most oral antifungals are not safe.
- Most oral antivirals for herpes are safe.
- Warts: destructive therapies (liquid nitrogen)
- Use permethrin or sulfur in petrolatum for scabies and occlusive therapy for lice.
Resources


• The IJWD publishes articles pertaining to dermatologic medical, surgical and cosmetic issues faced by female patients and their children.
• Original Research Articles, Review Articles, Unusual Case Reports, New Treatments, Clinical Trials, Education, Mentorship & Viewpoint Articles.
• Open Access Model
• Indexed on PubMed Central
• 40% of Profits go to WDS
• Reduced Fee to Publish for WDS Members
• Donate to Help Defray Cost for Authors
• Rapid Turnaround

For More Information, Visit: www.ijwdonline.org
Thank you for your kind attention.
Any questions? Comments?

Jenny Murase  jemurase@gmail.com
Disclaimer

- This presentation material is intended to serve as an initial reference resource and not as a complete reference resource. It does not include information concerning every therapeutic agent, laboratory, or diagnostic test or procedure available. It is intended for physicians and other competent healthcare professionals who will rely on their own discretion and judgment in medical diagnosis and treatment.